Date: April 9, 1998

Subject: Minutes from the April 1, 1998 Teleconference Between the Environmental Protection Agency (EPA) and Representatives from Rocket Engine Test Firing and Engine Test Facilities.

From: Brian Strong
Michael Wiggins

To: George Smith
Combustion Group/ESD/OAQPS (MD-13)
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

I. Purpose

The U. S. Environmental Protection Agency (EPA) recently began development of National Emission Standards for Hazardous Air Pollutants (NESHAP) for the rocket engine test firing and engine test facilities source categories. A teleconference was held on April 1, 1998 between the EPA and representatives from rocket engine test firing and engine test facilities. The purpose of the meeting was to introduce the stakeholders and EPA representatives, discuss the NESHAP process, present the schedule for NESHAP development, and address members' comments and concerns.

II. Attendees

U. S. Environmental Protection Agency (EPA)

George Smith

Midwest Research Institute (MRI)

Katie Hanks
Doug Lincoln
David Reeves
Brian Strong
Michael Wiggins

Industry Representatives (via teleconference)

Alan Canford
Allan Cenfield, Air Force Research
Marceia Clark-Ingram, National Aeronautics and Space Administration (NASA)/Marshall Space Flight Center
Everett Douglas, United States Navy
Ken Duke, AFMC
John Edmudson, SMC
John Edwards, AFB Missile Systems Center
Mark Feathers, Radian
Paul Goozh, NASA
Nick Himaras, Federal Aviation Adminstration (FAA)
Gail Murphree, NASA/Marshall Space Flight Center
Steve Rasmussen, AFMC-Hill Air Force Base
Jim Ryckman, AFMC
Glynn Rountree, Aerospace Industries Association (AIA)
Jeneene Sams-Smiley, NASA/Marshall Space Flight Center
Mary Senn, United States Air Force
James Sumner, General Electric Aircraft Engines
Mark Wade, Brooks Air Force Base
Joe Wander, United States Air Force

III. Discussion

A. Introduction

George Smith began the meeting by requesting that each of the industry, MRI, and EPA representatives identify themselves and their affiliation. Handouts on the information to be discussed were provided to the participants prior to the teleconference (see attachments). This meeting summary does not repeat the material in the handouts, but summarizes the discussions of the attendees. Mr. Smith discussed the reason for developing a NESHAP for the Rocket Engine Test Firing and Engine Test Facilities. He mentioned that Section 112 of the Clean Air Act (CAA) requires EPA to develop NESHAP and EPA has identified rocket engine test firing and engine test facilities as emitting several of the hazardous air pollutants (HAP) listed in section

112(b) of the CAA. Mr. Smith asked what HAP the industry emits. Steve Rasmussen stated that rockets emit a range of compounds depending on the type of rocket and the rocket size. Rockets use either liquid or solid fuel and emit compounds such as hydrogen chloride, aldehydes, beryllium, hydrazine, and dinitrogen tetraoxide. Mr. Rasmussen stated that Hill Air Force Base emitted 400 tons of HAP per year from jet engine test cells and 700 tons of HAP per year from rocket test firing last year.

B. Discussion of NESHAP process

Mr. Smith began discussing the scope of the source category by stating that the scope has not been determined at this point. He stated that in order to determine the scope, EPA needs to gather as much information as possible.

James Sumner asked what would be included in the source category beyond jet engine test cells and rocket test firing facilities. Mr. Smith stated that all engine types would initially be examined, including diesel engines and non-aerospace turbines.

Mr. Rasmussen commented that there are similarities between some jet engine test cell facilities, but rocket engine testing varies greatly depending on the rocket type. He remarked that there are not very good sampling techniques to examine the emissions from rockets and that rocket emissions vary greatly.

The industry representatives recommended that jet engine test cells, rocket test firing facilities, and diesel engines and turbines should all be subcategorized. Mr. Smith mentioned the possibility of delisting the source category. Mr. Rasmussen stated that EPA needs to look at the size of the industry and the current control technology in order to make the decision for delisting.

Mr. Reeves (MRI) stated that in the aerospace NESHAP, EPA exempted space vehicles from the final regulation.

Mr. Rasmussen stated that some jet engine test facilities only have one or two test cells and that their actual emissions are less than the quantity required to be a major source. The only problem is "potential to emit" causes these facilities to be classified as major sources. He asked if these sources would be considered in the study. Mr. Smith stated that they would initially be examined.

The industry representatives stated that the EPA needs to look at the "big picture." They stated that airport facilities produce a large quantity of emissions, but the majority of these emissions were produced by incoming and exiting airplanes. They remarked that controlling the emissions from a test cell at one of these facilities will not drastically reduce the overall emissions.

In order to identify the types of engine testing and rocket test firing facilities the EPA project team is reviewing the FAA test cell study. The FAA test cell study only identifies enclosed test cells, but the EPA will also examine hush houses and test stands in determining the scope of the affected source category.

The industry representatives asked if the EPA is going to conduct tests for HAP emissions at jet engine test cells and rocket engine test firing facilities. The industry representatives indicated that in order to perform testing a sound methodology would need to be determined. Mr. Smith stated that the main problem with testing is funds. The EPA would need to have very good reasons to fund HAP tests. In this case, testing appears to be necessary because there is not a lot of information on HAP emissions from engine test facilities and particularly rocket test firing facilities. The industry representatives stated that they have limited test emissions data on jet

engine test cells and that the magnitude of emissions information on rocket test firing is significantly less. Mr. Sumner stated that General Electric (GE) might be willing to conduct tests, but he would need to check with his superiors and the industry. Mr. Sumner also stated that a testing methodology and protocol must be agreed upon both by the industry and EPA before any testing is done.

Allan Cenfield stated that Radian had performed a series of test on jet engine test cell facilities. A new study is presently being performed by Armstrong Lab. Data has not been released from the new study, but Department of Defense (DoD) representatives stated that they will look into an early release of the information.

The industry representatives stated that liquid-fueled rockets are currently being tested more than solid-fueled rockets. Different HAP are produced by the different types of rockets and while at this time most of the industry is pushing towards liquid-fueled rockets, there will always be a part of the rocket industry utilizing solid-fueled rockets which would result in different emissions. Mr. Smith asked if liquid-fueled rockets were better than solid-fueled rockets environmentally. An industry representative indicated that liquid-fueled rockets are supposed to have a smaller impact on ozone production because solid-fueled rockets emit more chlorine which then reacts with in/with the troposphere. Mr. Rasmussen stated that rocket emissions are estimated through the use of models and that none of these models have been tested in order to confirm the models accuracy.

Mr. Smith asked if any applicable control technologies and pollution prevention measures exist for engine test facilities and rocket engine test firing. Mr. Strong (MRI) asked about a pilot scale scrubber installed at a Navel Air Rework Facility located at Tyndall Air Force Base in

Jacksonville, Florida. The DoD representatives stated that the scrubber was installed as a test and was set up full scale at McLellan Air Force Base and then found to be impractical and that it could not handle the afterburner mode of military plane engines; the scrubber has been dismantled. Mr. Smith asked if the jet and rocket fuels could be examined and if the standards could be based on a low-emitting fuel. The industry stated that certain engines require a specific fuel. They also stated that standards based on a particular fuel would restrict engine manufacturers and possibly prevent manufacturers from developing new engines that operate more efficiently with another fuel.

Mr. Edwards stated that in testing beryllium rockets, the industry had contained the effluent for very small-scale rocket test, but no type of control has been used on larger rockets. The stakeholders stated that in some solid propellant testing for rockets a base is injected into the efluent of the rocket in order to neutralize the acid. The industry representatives indicated that there appears to be no control technology used for engine test facilities and rocket test firing. In which case, Mr. Smith stated that the EPA might have to set the maximum achievable control technology (MACT) floor at no control, but the EPA could still set standards for control of new sources. The stakeholders asked if EPA conducts a cost benefit analysis when deciding on a control technology. Mr. Smith stated that cost benifit is not considered an issue when looking at control devices.

The industry stated that aircraft engine test cells have come under more regulatory scrutiny in the last few years. A few of the States have prevention of significant deterioration (PSD) permits for test cells. The PSD permits limit the operation of test cells and limit the amount of criteria pollutants emitted. Mr. Smith asked if California required that HAP emissions

be reported. The industry stated that they were not aware of any States requiring HAP emission information.

C. Discussion of Schedule and Tentative Meetings

The industry representatives stated that it would be a good idea for EPA and MRI to visit both jet engine test cell facilities and rocket test firing facilities. Mr. Smith stated that EPA had planned on visiting four sites. He asked if there were any suggestions and Mr. Rasmussen stated that Hill Air Force Base would be a good site to visit. Hill Air Force Base has a rocket engine test facility which tests the Minuteman missiles and the Peace Keeper missiles. Hill Air Force Base also has 10-12 jet engine test cells; none of the test cells at Hill Air Force Base have any control devices. Paul Goozh of NASA suggested that if EPA visits the Hill Air Force Base then EPA could also visit the Thiokol facility where the space shuttle engines are tested. Alliance, which perforoms rocket test, is also near Hill Air Force Base. The industry representatives also suggested that EPA review previous site visit (trip) reports, video tapes, and other information in order to determine which sites are most desirable. The DoD environmental group was suggested as the primary contact in order to set up visits to military facilities. Ron Tickel, the CAA steering committee chairman at (703) 602-2787, would be the appropriate contact person. Jim Ryckman stated that he would send a draft letter for EPA to send to the DoD for requesting site visits. Mr. Smith asked which facilities in the North Carolina area would be good candidates. The industry representatives suggested Cherry Point, Shaw, Pope, and Seymor Johnson Air Force Bases as possible site visit locations.

Mr. Smith asked if the jet engine test cell and rocket engine test firing industry could be

represented by the AIA, DoD, and NASA and who would serve as the point of contact in each organization? Glynn Rountree stated that he would be the point of contact for the AIA. The DoD stated that the CAA steering committee would need to appoint a contact person. Paul Goozh stated that he would be the point of contact for NASA. The industry representatives stated that almost all of the jet engine test cell facilities and rocket test firing facilities would be represented by these three organizations.

Mr Smith asked how the industry felt about using a voluntary questionnaire instead of an EPA Section 114 information collection request (ICR). The industry stated that they prefer a voluntary questionnaire. Mr. Reeves stated that a voluntary questionnaire worked well with some areas covered by the recent aerospace manufacturing and rework facilities NESHAP. The consensus of the group was to try and use voluntary questionnaires where appropriate to collect the needed industry/emissions information.

Mr. Smith asked how the industry wants to keep in contact. The industry stated that they had worked on a previous project over the Internet and they suggested that we set up a web site for the NESHAP. The NESHAP web site could be used to coordinate meetings and inform the industry of the EPA's progress in developing the standard.

Mr. Smith decided that a face-to-face meeting between the industry and EPA representatives needed to be set up. The meeting date was decided upon to be April 22, 1998 at 8:00 AM and to be held in Research Triangle Park, North Carolina. The purpose of the meeting will be to discuss the industry, break the industry into task groups, and to discuss the necessary steps for completing the NESHAP. The agenda will be drafted and sent to all participants prior to the meeting date.

ATTACHMENT

MEETING AGENDA

AGENDA--ENGINE TESTING NESHAP
APRIL 1, 1998 INDUSTRY MEETING

INTRODUCTIONS

- George Smith EPA
  EPA Lead Engineer
  Phone: 919/541-1549
  E-mail: SMITH.GEORGEF@epamail.epa.gov
  Mailing Address: George Smith
  Combustion Group/ESD/OAQPS (MD-13)
  U. S. Environmental Protection Agency
  Research Triangle Park
  RTP, NC 27711

- Midwest Research Institute
  Contractor
  Brian Strong
  Phone: (919) 851-8181 extension 5472
  E-mail: bstrong@mriresearch.org
  Mailing Address: Brian Strong
  Midwest Research Institute
  5520 Dillard Road, Suite 100
  Cary, NC 27511-9232

- Introduction of stakeholders on the line

PURPOSE

- Clean Air Act Section 112 (Air Toxics) requires National Emissions Standards for Hazardous Air Pollutants (NESHAP)

- EPA has determined that engine test facilities and rocket engine test firing may emit several of the hazardous air pollutants listed in section 112(b)

- EPA is required to promulgate NESHAPs for engine test facilities and rocket engine test firing by November 15, 2000

PROCESS

PHASE I--Data Collection

- Determine scope of the source category

- Industry profile including:
  - Facilities and facility location
  - Identifying types of facilities (ie. engines/rockets tested)
  - Economic data

- Process description
  - Testing schedules
  - HAP and non-HAP emission points
  - Pollutants emitted

- Applicable control technologies and pollution prevention
  - Description of control technologies
  - Safety considerations w/installing control technologies
  - Pollution prevention measures
  - Control efficiencies/emission reductions
  - Control costs

- Current industry practices relative to air pollution control

PHASE II--Regulatory development

- Proposed standards including:
  - Emission limits based on maximum achievable control technology (MACT) standards
    - Differing standards for new and existing sources:
      New sources "..not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator"
      Existing sources "the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emission information)...."
  - Compliance dates
  - Test methods and compliance procedures

Monitoring and/or inspection requirements
Recordkeeping requirements
Reporting requirements

- Final standards

SCHEDULE

- Background Information
  March through May 1998

- Site Visits
  June through December 1998

- Section 114 Information Collection Request
  July 1998 through January 1999

- Testing
  August 1998 through March 1999

- Proposed Standards
  November 1999

- Final Standards
  November 2000

TENTATIVE MEETING TOPICS/TIMES

- EPA plans the following tentative meetings to give stakeholders the opportunity to comment on the regulatory process

- Need to determine the mode of contact for meetings (is e-mail possible, etc.)

- Scope of the source category
  May 1998

- Meeting to discuss background information

June 1998

- Meeting to discuss site visits
  August 1998

- Meeting to discuss Section 114 information collection request
  September 1998

- Meeting to discuss testing
  October 1998